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The American Biology Teacher

Vol. 7 MAY, 1945 No. 8

A Living Biology Laboratory
- - - - - - Irving C. Keene 173

Teaching Plant Collecting in a Beginning Botany Course
- - - - - Egbert H. Walker 176

The President's Page - - - - - 180

Membership - - - - - - - - - 181

Previews of Biology
- - - - - - Irene Hollenbeck 182

How Teachers May Promote Summer Garden Projects
- - - - - - Erwin H. Shinn 184

Spring Flowers - Cross-word Puzzle - M. Blanche Cochran 186

A Simple Classroom Experiment
- - - - - Marvin D. Solomon 189

Collecting Lady Beetles
- - - - - - A. Franklin Shull 189

Index to Volume 7 - - - - - - 190

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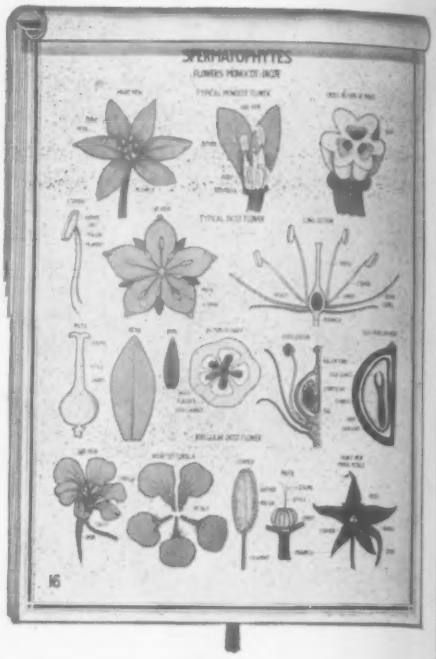

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Publication of the National Association of Biology Teachers.

Issued monthly during the school year from October to May.

Publication Office—N. Queen St. and McGovern Ave., Lancaster, Pa.

Editor-in-Chief—JOHN BREUKELMAN, State Teachers College, Emporia, Kan.

Managing Editor—O. D. ROBERTS, 117 Harrison St., Oak Park, Ill.

Subscriptions, renewals, and notices of change of address should be sent to the Secretary-Treasurer, M. A. RUSSELL, 403 California Ave., Royal Oak, Mich.

The entire Staff List will be found in the October and February issues.

Annual membership, including subscription, $2.00, outside United States, $2.50.

The American Biology Teacher

Vol. 7 MAY, 1945 No. 8

A Living Biology Laboratory

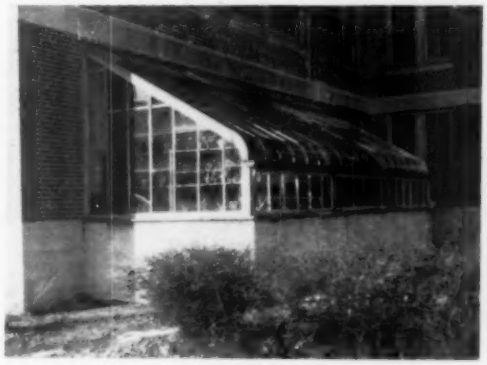
IRVING C. KEENE
Watertown High School, Watertown, Massachusetts

I can clearly picture the classroom in which I took my first course in high school biology. The room had three bare walls. In front of one of the three windows stood a stand with three sickly looking plants on it. In one corner of the room was an aquarium so sadly neglected that it was seldom observed by the students.

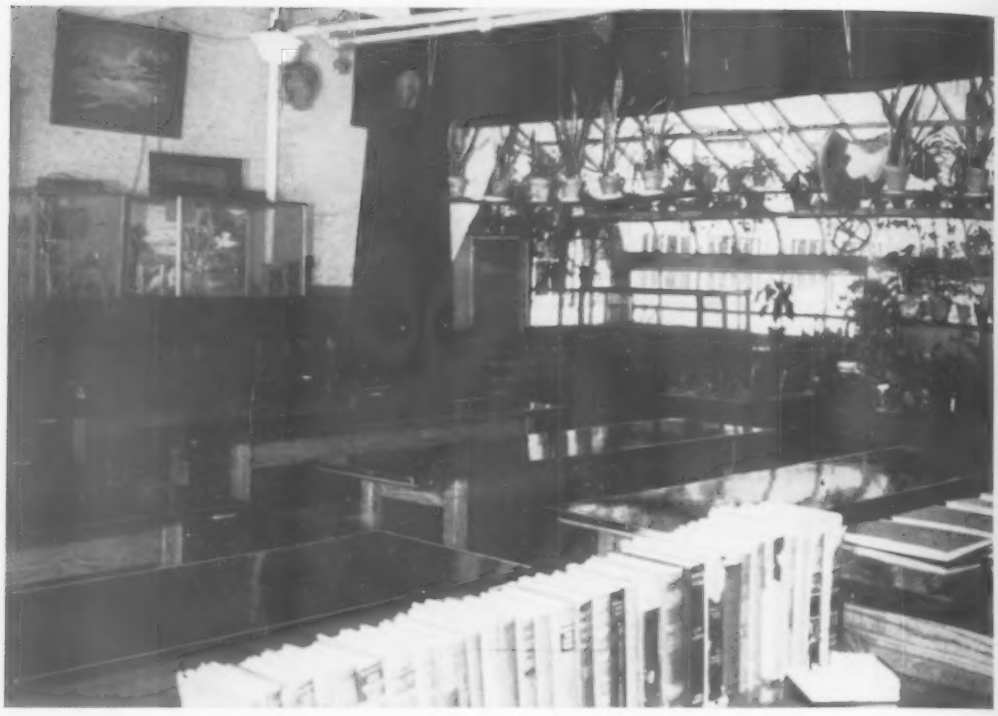
There is no high school subject which, in my opinion, requires that the room reflect the nature of the course more than does biology. The interest and enthusiasm of the students increase with the attractiveness of the laboratory. So interested are the students that I find it necessary to set a limit of four o'clock as the latest hour they may remain after school. They would probably not stay two hours after closing time if they were not interested.

Our school is located in a thickly populated area where the opportunities for field trips are not as good as in country regions. Therefore, I make it a plan to stock our greenhouse in the fall with as many living specimens as possible from the region about our school, always bearing in mind that what a student sees with his eyes he retains much longer than what he reads or hears.

We are very fortunate at Watertown High in having an extension to one side of the laboratory to provide a greenhouse (Figure 1) which is 24 feet long



and 15 feet wide. May I give two suggestions in case your school is planning to construct such a necessary addition to the biology laboratory. First, be sure that it faces in such a direction that it will receive the sunlight throughout the day. Our greenhouse faces in an east-



erly direction, the result being that during the afternoon the sun light is entirely shut off by the west wing of the building. Second, have the greenhouse floor made of cement with wooden walks between the plant beds. This will give you a chance to moisten the floor, providing moisture for the plants, which is such a vital requirement. Sliding doors, containing glass panes, can separate the laboratory from the greenhouse.

Figure 2 shows a view of the laboratory and greenhouse as one enters the room. Our laboratory tables and benches were made by our boys in the Industrial Arts Department. They seat four students very comfortably. They are made of oak with masonite tops. The tops are not provided with an acid-resisting surface. We use so few chemicals which would damage the table surfaces that it did not seem necessary to provide them with acid-resisting paints.

In the rear of the laboratory are two aviaries, large enough to provide plenty of freedom for the birds. At present, the smaller of the two has a pair of Parrakeets in it. The larger aviary has a pair of Zebra Finches. I would recommend the Zebra Finches in case you plan to keep some birds. They are very quiet, intelligent, and industrious. They will build their nest and lay eggs soon after being placed in the aviary. The Parrakeets are interesting but apt to be noisy at times.

Notice, in *Figure 2*, the dark slide curtains which separate the laboratory from the greenhouse. These make it possible to black out the laboratory for motion pictures and glass slide projection.

In the extreme corners of the greenhouse, we have a three-frame observation bee hive at the left, with an outlet and a bog terrarium to the right. Both of these living exhibits prove interesting to the students.

Figure 3 presents a view from the rear of the laboratory looking toward the teacher's laboratory bench, aquarium stand, and the opposite corner of the greenhouse.

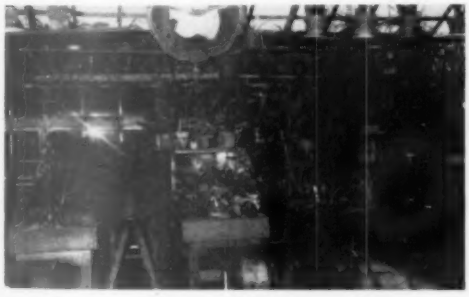


Figure 4 is a general view of our greenhouse. We have three plant beds, 8×3 feet in size. The one at the left is a cacti bed. The center bed is three-quarters glassed in, to provide for moisture. Here we keep ferns and tropical plants. The third bed has various plants in it. One of the most interesting plants we have is *Borviea volubilis*. Each school year, after a resting period during the summer, it climbs to the top of the greenhouse so fast that one can almost see it grow.

I hope that you can gather a few ideas from this article which will enable you to make your laboratory a more welcome place, in which students will gather. The contacts and experiences I have had with my students in the laboratory after school are my most cherished memories of teaching.

FIELD TRIPS ISSUE II

IN RESPONSE TO MANY REQUESTS, we are planning a second Special Issue on Field Trips, with Lee R. Yothers, who set the standard for specials with his first *Field Trips Issue*, Oct. 1941, as guest editor. Send manuscripts and suggestions at once to LEE R. YOTHERS, *Rahway Public Schools, Rahway, New Jersey.*

Teaching Plant Collecting in a Beginning Botany Course

EGBERT H. WALKER
Smithsonian Institution, Washington, D. C.

Many high school and college graduates with an interest in plants have recently found themselves thrust suddenly into the midst of an entirely new plant environment. At home they knew most of the common plants about them, as quackgrass, spring beauties, sugar maples, and many others, but in their new locations they cannot even say with certainty that the palm which shades them as they write letters home is a coconut palm. As for the branching tree against which they lean their rifles—well, they may have heard of banyans and seen pictures of multitrunked trees, but that was just a queer idea pictured in their botany textbooks years ago. Encouragingly, many of these erstwhile youngsters have a gnawing curiosity about these strange plants around them, and are burning with a desire to know their names. But there is no one at hand to tell them, and, so far as they know, there is no one on earth who can help them out. If they do happen to recall some beloved teacher whom they think might know, how are they to convey an idea of each of these objects of curiosity, so that they will be recognized? In school they were taught to examine cross sections of leaves and stems or watch the "sap" rise in a white geranium set in a bottle of green ink. If they advanced a little farther, perhaps they learned how to identify flowers with a specially prepared local spring flora or even struggled about a bit with Gray's Manual. But all they learned in two or three courses will not help them to identify a Polynesian chestnut (*Inocarpus edulis*) or a Portia tree (*Thespesia populnea*).

Their problem, however, is very simple if they only knew it—namely, to send a properly prepared herbarium specimen to any of several institutions in this country for identification. The reason they do not know this solution is doubtless because they have never seen herbarium specimens nor been shown their significance and use, and, what is more important, they have never learned to prepare them. And *that* is the subject of this paper.

With the development around the beginning of this century of several new branches of botany, such as cytology, ecology, genetics, and the like, beginning botany courses became crowded. The naming of plants and the making of individual student herbaria, which were usually included in beginning courses before that time, were now omitted. Taxonomy was relegated to a minor place toward the end of the course, and the students departed without even carrying away a notebook full of dried specimens to gather dust and insects in the attic at home. The college herbarium, if indeed there was one, came to be looked upon by the students, and even most faculty members, as a mixed haystack, where old fogies were busy digging for new species and the adjacent libraries were merely places where these round-shouldered abnormalities hunted for prior names to replace the long known designations of even our familiar plants. The complacency and busy

aloofness of the herbarium workers did little if anything to dispel this distorted impression. Hence the youth, trained in the new type of beginning botany and now faced with a desire to know the names of the plants in their strange new environment, never think of submitting specimens to specialists for identification.

The problem is not confined to youths in the army and navy. A man trained in animal husbandry recently came to a herbarium to identify a plant he had seen on an official investigation of livestock possibilities in Central America, but of which he had made no specimens. It had apparently not occurred to him to take a sample of the plant and to label, press, and dry it. A botanist in charge of exploration for certain useful trees in South America reports that, in spite of his directions, various trained men on his staff will not collect herbarium material to support the reports of their discoveries. They do not know how to prepare them, and do not recognize that specimens are valuable in confirming their native peon guide's statement that the trees he leads them to are actually the kind they were directed to investigate. A forester with a doctor's degree said he had never learned to make herbarium specimens, because in New England the number of commercial timbers was small and they were easily learned in dendrology courses.

The difficulty arises from the failure to teach students in beginning courses (1) how to prepare herbarium specimens, (2) that such specimens are in reality merely evidences of the existence of such plants in the places whence they came, and (3) that herbaria are assemblages of such preserved records. From this point of view herbaria are akin to the room where legal evidence is stored for use in court trials, rather than to a barn where the dry cuttings from a weedy hay field are stacked. A herbarium specimen is a means to an end, an instrument by which the collector can retain the characteristics of a plant in a certain locality and use them in finding its name and other facts through identification by a qualified botanist in a herbarium where other "evidence" is preserved. Then, having served this purpose, the specimen, if it is worthy, may be deposited with others as evidence that a plant of the species it represents occurs in the place where it was found, and in that place has certain characteristics. These facts may eventually prove valuable in solving some important scientific problem.

I believe, therefore, that beginning botany students, either in high school or in college, or both, should learn the rudiments of preparing herbarium specimens. I am not advocating that they must learn to use Gray's Manual in identifying these plants or even a key to the spring flora, for that is another subject. These specimens should be gathered, labeled, and prepared in accordance with the standard procedures, not just a single leaf and flower snatched from a tree, dried through neglect in the unused textbook, stuck on a sheet of notebook paper with library paste, and labeled with the common name only, scribbled on the sheet. The significance of herbarium specimens as scientific evidence of certain conditions in nature and their use in settling scientific problems should be taught in colleges and at least touched upon in high schools. If this is done, graduates will have knowledge of a means whereby they can continue their interest in botany after they leave the classroom, something which all too few have today. By this means, those who travel may become incidental contributors to valuable scientific collections and thus participate in the growth of scientific knowledge. Those who go into other branches of science, as agriculture

for example, will have a means whereby they can learn to know new and important plants that concern their special fields of work.

An added value that will accrue from the teaching of the simple art of preparing herbarium specimens is that students will learn the value of documenting and verifying their statements of what they have seen, and verifying their first judgments and observations through more careful scrutiny of representative specimens of the plants in the field.

Further lessons in accuracy and thoroughness come through documenting specimens. If a detective taking finger prints at the scene of a crime should fail to record where and when the impressions were made, these finger prints could hardly be accepted as legal court evidence. Likewise plant specimens without data on where, when and by whom collected, and on the characters of the plant which are not shown in the specimen itself, are useless scientific evidence.

The art of making herbarium specimens can be taught in any vacant lot with inexpensive equipment. (In an emergency plants may be uprooted and brought into the laboratory, but as plant collecting is a field occupation, such a necessity would be unfortunate.) In our program of encouraging men in the service to collect scientific specimens, emphasis is being placed on the ease of improvising equipment. Printed directions (see appended bibliography) often give one the impression that an entrenching trowel, a wooden frame, trunk straps, plain collecting paper, felt driers, and a metal vasculum are essentials. It is true that better and more elaborate equipment usually results in better specimens of a greater range of characters, at least in the hands of the beginners. But an old kitchen carving knife or garden trowel, some pieces of cardboard cut from a grocery store carton, ropes cut from the end of a clothesline, newspapers, and paper napkins are acceptable substitutes. The last is the least desirable replacement, but a recent beautifully pressed and dried collection from the dripping Aleutians attests to the effectiveness of paper napkins. The extra labor involved must have been excessive. A vasculum is an individualist's tool; few professional taxonomists use it.

There are certain general procedures in plant collecting that all observe. Experience has shown their effectiveness. They lead to reasonable uniformity, which is essential for integrating collections by various people into workable herbaria. For example, specimens should never exceed the dimensions of a standard sheet of herbarium mounting paper, $16\frac{1}{2} \times 11\frac{1}{2}$ inches, and should preferably be an inch or two smaller. But there is a vast diversity in details of plant collecting. It is well for a beginner to listen to an individualist's detailed directions and then remember the quotation:

> " 'Tis with our judgments as our watches, none
> Go just alike, yet each believes his own."[1]

Beginners often feel that if they collect plants, then they must mount them on clean white sheets of paper. They soon find, however, that the labor and cost of mounting plants is excessive and out of proportion to the value of the collection to them. Hence they stop collecting, not realizing that one can keep and satisfactorily use unmounted specimens. Such specimens left in folded sheets of newspaper, tied in bundles, can usually serve the average collector's purposes very adequately, they need be mounted only when incorporated in a herbarium where they will be frequently referred to.

[1] Pope's Essay on Criticism, pt. 1, line 9.

Teachers, especially in high schools, may rightly hesitate to teach even the rudiments of making herbarium specimens, because they themselves do not know the names of the plants of the adjacent vacant lot, and students can ask very embarrassing questions in such circumstances. Some may not wish to escape from this predicament by the means used by a certain park-ranger-naturalist. When pestered beyond endurance by a garrulous visitor who wanted to know the name of every plant, he replied: "Madame, there are 960 species of plants in this park, and I'm a specialist on bears." Another way is to fortify one's self in advance by submitting a collection to a specialist for identification. It is well, however, to remember that taxonomists are often reluctant to name collections unless they can retain a set for incorporation into their own herbaria; also that they may lay a bundle aside until they have time to make a critical and thorough examination, which time may not come for months, and all too often for years. Usually a teacher's needs are wholly satisfied by more casual identifications, which the majority of specialists would be glad to furnish at once, if they knew the circumstances.

The following non-exhaustive annotated bibliography lists most available directions on how to collect plants. At least two other papers on this subject are known to be in preparation.

1. Blake, S. F. *Directions for collecting flowering plants and ferns.* U.S.D.A. Dept. Circular 76, 8 pp. *illustr.* Revised edition, 1932. Obtainable from the Supt. of Public Documents, Washington 25, D. C. Price 5 cents.

2. Fogg, J. M. *Suggestions for collectors.* Rhodora 42: 145–157. 1940. Concerns the special problems met in collecting certain groups of plants. Reprints obtainable from the author, Vice Provost, University of Pennsylvania, Philadelphia. Price 20 cents.

3. Fosberg, F. R. *Plant collecting manual for field anthropologists.* 22 pp. 1939. Somewhat simplified directions intended to encourage and guide anthropologists in supplementing their special collections with valuable supporting material. Obtainable from the American Fiber-Velope Mfg. Co., Botanical Supply Dept., 229–233 N. 63rd St., Philadelphia, Pa. Price 35 cents.

4. Hitchcock, A. S., and A. Chase. *Directions for preparing herbarium specimens of grasses.* 4 pp. 1909. U.S.D.A., Bureau of Plant Industry (BPI 442). Most suggestions are equally applicable to all types of collecting. Obtainable from Mrs. A. Chase, Smithsonian Institution, Washington 25, D. C.

5. Johnston, I. M. *The preparation of botanical specimens for the herbarium.* 33 pp. *5 pl.* 1939. A more exhaustive work for the professional plant collector, worthy of the beginner's careful consideration. Spanish edition, 1941. Obtainable from the Arnold Arboretum of Harvard University, Jamaica Plain, Mass. Price 30 cents.

6. Smithsonian Institution, Staff of. *A field collector's manual in natural history.* 118 pp. *illustr.* 1944. Concerns geological and zoological specimens as well as botanical. Prepared especially for members of the armed forces. Obtainable by interested service men free on application to the Smithsonian Institution; price to civilians, 50 cents. A mimeographed extract of the botanical part may be obtained from the author of this paper without cost.

NOTES ON LOCALS

Information essential for permanent records and for use in building a closer organization of the National Association of Biology Teachers continues to come from the few faithful.

Chicago Biology Round Table reports meetings for both March and April. Attendance for March was 60, an increase over last year's meeting. April attendance was 35. These meetings, both held at the Central YMCA, were respectively an illustrated lecture on *Native Wildflowers* and *Recent Advances in the Knowledge of the Effects of Alcohol and Alcoholism.*

April 16 the *Biology Teachers Club of Southwestern Pennsylvania* held a banquet in the Army Mess Hall, Pitt Hotel. The speaker was Dr. J. Warren Nystrom, Assistant Professor of Geography, University of Pittsburgh. We should soon have a report of new officers for this organization, as the nominating committee made its report at the said meeting.

Indiana State Biology Teachers Association held its first annual Spring meeting on April 21. This organization has been meeting only each Fall in conjunction with the

(Continued on page 189)

The President's Page

July 1, 1945 completes not only seven years existence of THE NATIONAL ASSOCIATION OF BIOLOGY TEACHERS but, likewise, the permanent establishment of this organization. Various factors have played their part to secure this status: namely, the closer association, oneness of purpose, and friendliness made possible by the annual, regional, and business meetings which have been held; the far reaching effect of the journal, *The American Biology Teacher;* the loyal support of the affiliated locals; the value derived through better organization and the creation of necessary offices and committees; the faithful cooperation of teachers of biology who gave of self, time, effort, and money; increased publicity secured through additional activities and projects; and confidence gained and held from business concerns due to the punctuality of the Association in meeting all its obligations.

THE NATIONAL ASSOCIATION OF BIOLOGY TEACHERS is ready to expand. With an understanding of the past and an eye on the future, numerous opportunities present themselves to the Association really to do specific things for the betterment of the teachers of biology. Exchange of ideas, unified thought, development of systematic procedures, increased knowledge of living things, the fulfillment of an educational unit requirements, can be accomplished by the establishment of a teachers' camp accepted and affiliated with some University or College of good repute. Fun through congenial association and an increased knowledge of Nature can be accomplished by Conducted Travel Tours organized and planned by the Association and some leading University or College, and participated in by biology teachers. Knowledge fortified by travel develops experiences that are invaluable. Establishment and acceptance of specific educational requirements for teachers of biology can change the present concept of biology, from a lukewarm attitude for the need of this subject to a MUST, through better teaching because of better preparation and training. Unification, organization, and education of teachers of biology can influence, to a large measure, the salaries paid to these teachers. Adequate salaries, earned through competence and results achieved, make for a happier and more contented teacher. Through specific methods (movies, lectures, pamphlets, calendars) Community, State, and National Departments should be aroused to have a greater appreciation and a more accurate knowledge of what is presented in a biology course which can be utilized by them to advantage in conveying and establishing their principles, needs, and desires to the public. The Association might sponsor adult education classes to reach the mass of the population who were unable to profit by biology, yet need to have a practical working knowledge of this subject, to develop a healthier and happier citizenry.

The health of the Nation, to a far greater degree than is realized, is dependent upon the biology taught by its teachers. Standards for teachers of biology must be the very best, so that they can project workable, livable biology to their students. THE NATIONAL ASSOCIATION OF BIOLOGY TEACHERS was organized to help the teachers of biology to improve themselves. May the Association in its expanding program fulfill this goal to a degree not now calculable!

HELEN TROWBRIDGE

CHANGE OF DUES

Present day cost increases have forced the Science Press to increase its cost to the NATIONAL ASSOCIATION OF BIOLOGY TEACHERS for printing *The American Biology Teacher* by about 21 percent. Other annual expenses have gone up in proportion to those of printing. Because of these changes in the financial budget the Executive Board was forced to alter its annual dues from $1.50 to $2.00.

It is imperative that the Association meet its financial obligations on time and this can be done only through an increase in annual dues. Investigation shows that $2.00 is still a low figure for a national organization's annual dues; but, the Executive Board wanted to keep the dues down to the minimum to make membership available to all teachers of biology. The organization, with the 50¢ increase in dues and with the loyal support of its members, can continue on the same high level of the past and improve yearly to become a better and more worthwhile Association giving to its members additional advantages. THE NATIONAL ASSOCIATION OF BIOLOGY TEACHERS asks for your 100% cooperation to meet its present day financial obligations.

HELEN TROWBRIDGE

SILVER BURDETT HAS A BIRTHDAY

Silver Burdett observes a gala occasion this year as the company reaches its sixtieth birthday. Edgar O. Silver, its founder, would scarcely recognize the offspring of the humble publishing business he set up in Boston in 1885. His list of one item, *The Normal Music Course*, has grown and expanded to include basic texts in the major subjects in both primary and secondary school levels, and Silver Burdett Company has emerged as one of the country's leading textbook publishing houses with offices in New York, Chicago, and San Francisco.

The publication schedule for 1945 is in keeping with the diamond jubilee. The year opened with the launching of a new basic reading series, *Learning to Read* by Nila B. Smith. In April, the sixty year old tradition of pioneering in the field of music was carried on as the Fourth Book of the *New Music Horizons* series came from the press.

IT HAS BEEN ESTIMATED that the total hereditary makeup of a human being consists of at least 10,000 individual genes.

EMERSON SAID "The creation of a thousand forests in one acorn."

Membership

The past year has seen a considerable increase in membership, although the total is still far short of the goal set last year, namely 3,000 members. The geographic distribution is better than in the past; all but two states are represented and the number of readers in the sparsely settled areas has shown a proportionately larger increase. As might be expected, about half of our membership is located in about six or seven states. These are the states with the large populations and the large cities. The following list is approximately correct for April 1, 1945; the second figure is for the same period a year ago.

	1945	1944		1945	1944		1945	1944
Ala.	22	14	Mass.	90	80	S. Dak	6	7
Ariz.	6	7	Mich.	89	84	Tenn.	13	13
Ark.	4	3	Minn.	34	31	Texas	30	22
Cal.	129	126	Miss.	7	7	Utah	0	1
Col.	17	8	Mo.	25	23	Va.	50	23
Con.	32	23	Mont.	11	10	Vt.	4	3
Del.	3	2	Neb.	13	8	Wash.	23	22
D. C.	25	24	N. H.	16	11	W. Va.	20	20
Fla.	8	4	N. J.	55	62	Wis.	67	45
Ga.	7	2	N. M.	3	3	Wyo.	2	0
Idaho	4	5	N. Y.	158	153	Alaska	1	1
Ill.	208	188	N. Car.	25	12	Canada	10	7
Ind.	81	68	N. Dak	6	1	Canal Zone	2	2
Iowa	44	31	Ohio	158	126	Hawaii	2	2
Kan.	35	29	Okla.	12	14	Mexico	1	1
Ky.	18	13	Ore.	33	29	Puerto Rico	5	4
La.	14	9	Pa.	169	160	South America	3	2
Maine	6	10	R. I.	13	9	India	1	0
Md.	30	22	S. Car.	7	8	Total	1859	1594

Previews of Biology

IRENE HOLLENBECK
Senior High School, Salem, Oregon

"Biology is surely going to be fun," commented one student as he left the classroom that first day of school. "Yeah, and you get to do things in that class," another replied. These remarks, and the lively and sustained interest in biology in the weeks that followed, were prompted by a teaching procedure the opening day in which the biology room assumed the appearance of a "Science Fair."

In order to provide the student with an interesting and active introduction to biology during the period that the teacher was occupied with the registration of the class many exhibits, games, books, and construction materials were on display about the room. Students were invited to explore the room and investigate anything that appealed to them. It was also suggested that they be ready to report the next day on any interesting observations made.

Below are listed some of the materials and methods which have been used with success in the writer's own classes the first day of school, and throughout the year.

Things to Do

1. *Run the projector.* In one corner of the room set up a projector and a selection of student-made slides. One set of interest to students is a "Murder Mystery." The first slide is a sketch of a track story as written in the snow and shows evidences of a struggle and bloodshed. The second slide asks for the names of victim, villain, and witnesses, and the third gives the clues in the form of sketches of the feet of animals.
2. *Play a game.* Locate a game device such as an electric chart in an uncrowded corner of the room so that a number of students may assemble around it.
3. *Look through the microscope.* Set up a microscope showing some of the animals to be found in pond water. If possible have a former student present to assist.
4. *What is it?* Arrange a number of interesting specimens such as cocoons, a water-tiger,[1] a shark's egg, and a skull on a shelf or table and direct the students to answers posted elsewhere.
5. *What's wrong with this picture?* Draw on the blackboard or post on a bulletin board several pictures such as a hawk with the wrong kind of toes, or a group of polar bears against a dark background. Have slips of paper handy so that students may write their answers and place in a ballot box below the pictures.
6. *What can you make?* Provide modeling clay, etched glass slides, colored paper, and colored pencils for those who would like to try out this activity.
7. *Can you figure this out?* Place an interesting model where students can examine it. Questions concerning the model may be written on one side of a card, with the answers on the back.

Biology and Your Future

On a bulletin board post large pictures of people in various occupations. Connect these by means of colored ribbon to materials associated with that occu-

[1] A term sometimes applied to the larva of large species of water beetles; they have large jaws and do not hesitate to attack animals larger than themselves.

pation which are on display on a table below. It is also helpful to place near each exhibit cards bearing stimulating questions or suggesting things to do or observe in connection with the display.

1. Artist. Display commercial art work making use of biological designs (greeting cards, wall paper, Disney insignia for the air corps); hand-colored nature photographs, decorative textiles having biological designs.

2. Aviator. Display the book *Biology of Flight* and several of the manuals regarding fauna and flora of various regions in which pilots might be forced down.

3. Doctor and Nurse. Set up a microscope with easily observed specimens. Display the Turtox human manikin and such books as *Doctors at Work*, *Nurses at Work*, and *Miracles of Military Medicine*.

4. Entomologist. Exhibit insect cases. Instruct the students to count the number of flies in the mount, find the fly that mimics a bee, find the tachina fly[2] which was imported to kill the earwigs, etc.

5. Farmer. Exhibit local products of inferior and superior quality. Ask the student to find out what knowledge of biology a farmer must have in order to produce the superior quality.

6. Forest Ranger. Attract the boys interested in forestry by a display of seedling trees, posters, and the books *Green Kingdom* and *Forest Trees of the Pacific Coast* (or other locally suitable books).

7. Housewife. Display government charts on nutrition, yeast, mold, damage done by clothes moths or other household pests.

8. Gardener or florist. Arrange seeds, cuttings, and "bulbs" of interesting plants on the table. Invite the students to start a schoolroom garden. Exhibit several unique flower arrangements.

[2] A parasitic insect (beneficial to man) the larvae of which feed upon other insects or their larvae.

Biology and You

1. Your Health. Post a map showing a student-made sanitary survey of the community health problems, or student-made charts dealing with other health problems.

2. Your Leisure Time. Upon one table display campcraft equipment; projects made by previous classes such as collections, models, maps and posters; and equipment needed for making insect collections, leaf prints, etc. Upon a second table provide empty aquaria, terraria, ant nests, animal cages, and a few of the materials and animals that

Do You Agree?

On a table display believe-it-or-nots such as the following:

Display	*Accompanying Statement*
a. Tomato on a plate	a. The tomato is a fruit.
b. Banana on a plate	b. The banana is a berry.
c. Two similar bowls of flowers; aspirin	c. Aspirin helps make flowers stay fresh.
d. Eggs (insect, chicken, others available)	d. Eggs respire. (Can you prove it?)
e. Various kinds of seedy fruits; an appendix or a model or picture of one	e. Appendicitis is often caused by seeds lodging in the appendix.
f. Horned toad.	f. The horned toad is not a toad.
g. Corn worm or apple worm	g. This is a young moth.

belong in them with suggestions as to how and what to collect to complete them.

3. Reading. Arrange a table display of interesting travel and science books and magazines opened to dramatic stories or pictures. Book reports of former students who have recommended the books for a permanent reading list may be displayed also.

This type of introductory class can lead into many phases of biology. The students may want to investigate the scientific method, study superstitions, or discuss the personal uses of biology. The exploratory idea may be continued during the week in such activities as: exploring the schoolgrounds, exploring at home (the basement, the backyard, the woodshed, or the garden), exploring in the library, and exploring with the microscope.

Any teacher who has the time and makes the effort to present biology in this manner will be repaid many times by the enthusiasm and anticipation which the students have for biology.

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How Teachers May Promote Summer Garden Projects

ERWIN H. SHINN

Extension Service, U. S. Department of Agriculture, Washington, D. C.

The production and conservation of food and fiber is as essential to winning the war as combat materials used on the battle front. While it is obvious that the farm population must assume the larger share in the production and conservation of food materials, there is much that many urban people can do to supplement the efforts of farm people in this direction. Because of labor shortage on farms, with the increased demand for a larger food production, farmers are in dire need of help to provide the food needed to feed our armed forces, to meet civilian needs, and the needs of our allies. It is, therefore, the sacred duty of town and city folk, both adults and youth, to do their full share in helping to produce and conserve food to feed our fighters and to meet civilian needs. They should grow all the food possible in their own gardens, back yards, community gardens, and help farmers harvest their crops when possible.

Urban people should learn how to eliminate food waste, to refrain from hoarding and practice the use of rationing coupons wisely and in accordance with rules and regulations. In the way of helping farmers to produce and conserve food, thousands of town and city boys and girls are offering their service in the campaign for food, especially during summer months. Here is a splendid

opportunity for urban youth to broaden their educational training by learning to do by doing, as well as serving their country in time of need in the war effort.

Teachers have always been potential forces in the development of the educational and the spiritual ideals of youth to the extent that attitudes have been changed from inactive to active participation in home and community activities. The extent to which urban youth would participate in any of the war activities in many instances might rest with the influence of the teacher who instructs them.

These are some channels through which teachers could aid in getting urban youth to work on farms during vacation periods, to have gardens of their own and also to assist in family projects:

(1) Make a strong patriotic appeal to youth by showing them why they have a responsibility in helping to win the war.

(2) Food will win the war and probably write the peace.

(3) Families that do not produce their own food may be the first to go hungry if and when a food shortage occurs.

(4) Our men in the combat service must and will be fed, because they are fighting our battles to preserve our democratic way of life including liberty and common decency. These soldiers are fighting for those freedoms upon which we have progressed and prospered in the past.

(5) All of us must give our best to help our fighters preserve that spiritual faith and idealism without which democracy will perish.

(6) Since food is so important in winning the war, every individual has a responsibility in helping to produce and conserve food needed to insure victory.

(7) Working in the home garden and on farms in the country by urban boys and girls will help not only to produce and conserve food and fiber fundamental to war needs, but it will help to develop good health and strong bodies in youth.

(8) Such experience will help also to develop self-reliance, initiative, and knowledge of nature on the part of youth who are often denied these opportunities in their own environment. This is an important part of their educational experience. Teachers should be able to accomplish considerable in stimulating youth to help produce and conserve food by appealing to their interest and showing them the importance of active participation in all wartime activities.

We can help to shorten the war by supplying our armed forces with the food they need and by building vital food reserves. At the same time adequate food must be made available to our civilian people to maintain health and good morale. To this end adequate production and efficient distribution must be maintained. Youth must assume greater responsibilities than ever before in helping out with home work so that father, mother, and older brothers and sisters may be relieved to do other kinds of work.

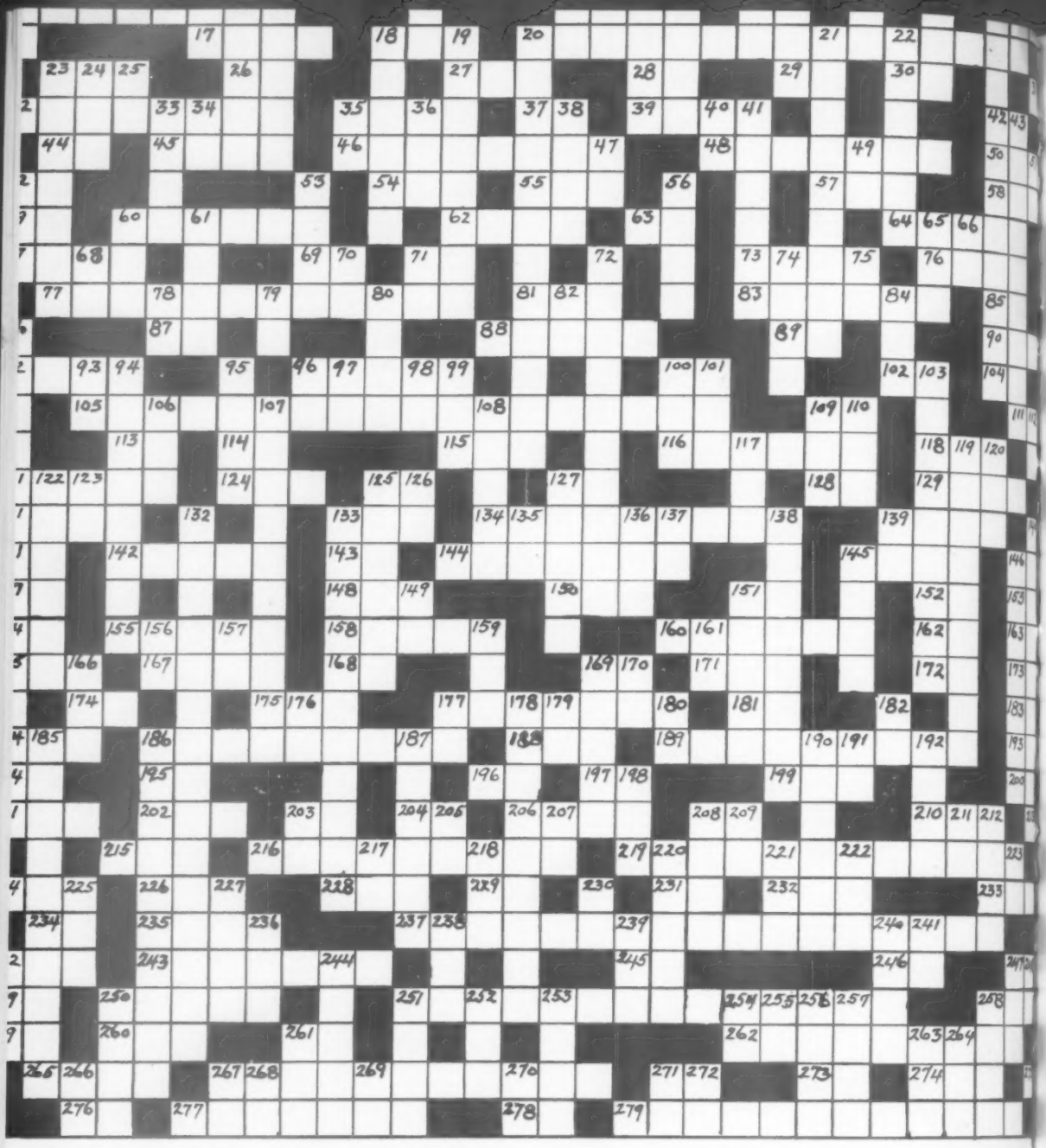
The one road to travel in winning this war is for every one to do his full part. Through this channel only can our democratic way of life be preserved.

BY THE WAY

CELLOTEX, or similar types of wallboard, can be used as a backing on which to mount shells and fossils. The mounts may be wired or glued on. The backing may be left in its natural color or painted to fit into the general color scheme of the lab or classroom.

X-RAY FILMS of the new miniature size may be obtained from the school physician or local hospital. The films may be bound between 2×2 glass plates and projected on the screen in the regular way. With the help of an interested doctor, a very instructive collection of slides may be built up.

NEXT TIME YOU GET READY TO PRESERVE a small display specimen in formaldehyde solution, put it in gelatin instead. Use *clear* gelatin; dissolve in hot water, add a few drops of formaldehyde and a few drops of acetone. Seal the specimen in and place the jar in such a position that the specimen settles down to where you want it. When the gelatin sets, you have a permanent mount.



SPRING FLOWERS

Across

1. Grape ———; incorrectly called "blue bell"
6. Delicate outgrowth on a plant
10. Pound
14. To "pant"
17. A teacher
18. One who loafs
20. Petals white inside, green striped outside; narrow linear leaf (3 words)
23. Pep, energy
26. Double "o"
27. Common viper of Europe
28. Form of "to be"
29. Preposition
30. Advertisement
31. Maine
32. Type of violet with an unusual leaf
35. Girl's name
37. Rhode Island
39. Place to sit
42. Symbol for lead
44. All right
45. Hobgoblins
46. Blue petals; hairy stems, lobed leaf; earliest flower
48. Common along roadsides, fields; yellow weed
50. Elaborate (abbr.)
52. Boy's nickname
54. To strike gently
55. National Education Association
57. Tint
58. A part doubled over on another
59. Prefix
60. Often called "honeysuckle"
62. Source of pork
63. Symbol for chlorine
64. Big
67. Girl's name in comic strip
69. Mountain
71. Symbol of aluminum

73. Support
76. Type of wire fence
77. Plant common in swamps; odor (2 words)
81. "Ostrich" of Australia
83. Wood ———; "sour grass"
85. Plural Latin ending
87. Adverb
88. Precious stone
89. Preposition
90. Slender
92. A desert dweller
96. From which flowers grow
100. Type of "cough drops"
102. Master of Science
104. Sergeant at Law
105. Yellow lily; Dog-tooth Violet (3 words)
109. Preposition
111. "Ship in distress"
113. French masculine article
114. Symbol for silicon
115. To speak
116. Wood ———; Lousewort
118. One who is "tops"
121. Cheers
124. Man's name
125. Master of Arts
127. Post Meridian
128. Knights of Columbus
129. A barge
131. Frozen water vapor
133. Circulatory medium in plants
134. White flower; orange colored sap
139. Blue ———; Mertensia
140. Georgia
141. Preposition
142. ——— -u-tan; "man of the woods"
143. House of Lords
144. Yellow-green flower; sepals longest; leaves whorled
145. Girl's name
146. Arid
147. 11
148. Aged
150. An appendage
151. Seventh note on scale
152. Preposition
153. Double "o"
154. Suffix
155. Symbol
158. Common wild flower habitat
160. An ill-smelling "lilly"
162. Oxford Dictionary
163. For hunting game
165. Past tense of feed
167. Queen's husband
168. Woman's Organization
169. South America
171. Calvin's nickname
172. Same as 151
173. West—north-west
174. Conjunction
175. "Conceit"
177. Sweet-scented, pinkish-white flower
181. Common reply on board ship, "——— sir"
183. Same as 162
184. Part of a play
186. Yellow; linear grass-like leaf
188. To apply to a purpose
189. Scarlet, yellow delicate flower with spurs
193. Flower product
194. Government issue
195. Suffix
196. Lieutenant
197. Preposition
199. Fifth month
200. 505
201. Terminal
202. To prepare fibers
203. Exclamation
204. Adverb
206. Domesticated
208. Company
210. A beverage
213. Yard
215. Plant "juice"
216. Minute, white petals on weak-stemmed, low plant; weed
219. White, small flowers in cluster; tiny plant common in low woodland (2 words)
224. A hint
226. Women's United Reserve
228. Girl's name
229. American Revolution
231. Same as 229
232. Atmosphere
233. Small "city"
234. Plural ending
235. A color
237. Nodding, white, yellow tipped, two-spurred, heart-shaped flowers (2 words)
242. Toward the stern of a boat
243. One who enjoys luxurious things
245. That is
246. Conjunction
247. Pronoun
249. Accomplish
250. Produced from type
251. Common weed on waste ground; tiny white flowers; triangular fruit (2 words)
258. A bucket
259. Three-toed Sloth
260. Drawing
261. Physician
262. Flowers light lavender striped with violet; small, set closely on slender spikes
265. Leaves have parallel veins
267. Stem tastes and smells like licorice
271. 1100
273. Symbol for neon
274. Form of "to be"
275. Missouri
276. Sunday School
277. Deep gold yellow, daisy-like; a composite found in wet meadows
278. South Dakota
279. Pale white cluster at tip; dull red berries; lily family (2 words)

DOWN

1. Exclamation
2. New Providence
3. Collection of people
4. Sounds of an owl
5. Symbol for copper
6. Height
7. Athletic Association
8. Commonly called "Flags"
9. Thorny shrub
10. Pound
11. A wager
12. Scott High
13. Boy's nickname
14. White flower; peppery-tasting seed pods thickly clustered on stem (2 words)
15. U–M
16. A composite; similar to Robin's Plantain
18. Bluish-white, delicate tufts of small flowers
19. White; characterized by "umbrella" leaf
20. Delicate white with pink stripes; linear leaf
21. White in terminal cluster; leaf coarsely toothed; in damp woods and meadows
22. Pennsylvania state flower
23. Some blue, white, or yellow; common in orchards
24. To anger
25. Maryland
33. Formed on top of fermenting beverage
34. Missouri (reverse letters)
35. Left half
36. Certified Public Accountant
38. Ice cream substitutes
40. Antemeridian
41. Common flower bed perennials
43. Blue, bell-shaped flowers; also cultivated
47. Auto Association
49. Symbol for gold
51. Symbol for silver
52. Form of "to be"
53. Sheep offspring
56. Source of linen
60. Amateur Athletic Union
61. Large, roomy boats
65. Ablative (abbr.)
66. Symbol for radium
68. "Urgent" in First Aid
70. Tuberculosis
71. Same as 51
72. White, delicate, 3 in a cluster; leaf long-stemmed (2 words)

74. Highway
75. Pair
78. Symbol for sodium
79. An article
80. Old
82. Double "M"
84. Large tree
86. Early tiny white long-stemmed flower; leaves in rosette cluster at ground (2 words)
91. Married woman's title
93. Yea, yes
94. Nodding yellowish-green flower of lily family; sessile leaf almost perforated by stem
95. Beautiful sweet-scented Shrub
96. South America
97. Boy's name
98. No. 97 reversed
99. Seniors
100. Center of wheel
101. Aids in cross-pollination
103. White, downy, sweet-scented composite
106. Plural article (Fr.)
107. Two long-stemmed woolly, heart-shaped leaves; 3 purple parts to calyx which is close to ground (2 words)
108. Common negro nickname
109. Writing fluid
110. New York City
112. Preposition
117. Even number
119. Yellow weed; strong orange sap
120. Elongated fish
122. To tempt
123. Exclamation
125. Common creeping weed with pinkish-white flowers; round leaf with scalloped lobes; "Cheeses or belly-buttons"
126. Chain store
127. Natatoria
130. Cheerful
132. Club-like spadix within a spathe; fruit green, then scarlet berries (4 words)
133. Scarce lavender flower of orchid family (2 words)
135. Left guard
136. Work hard!
137. Symbol for radium
138. Ill-scented maroon or white 3-petal flower of lily family; scarce
139. Baltimore and Ohio R. R.
140. Small, creeping, pale purple mint
145. Troublesome weed
146. Beautiful, white, 4 petals appearing before leaves; a tree
149. Accomplish
151. Path in woods
156. Satisfactory
157. Half an em
159. A salutation
161. Alternating current
164. Northwest
166. Dorothy
169. Gaseous water
170. Symbol for gold
176. Double "g"
177. Adverb
178. A crowfoot common in meadows
179. Pronoun
180. South Carolina
182. Symbol for lithium
185. Resembles wild strawberry except flower is yellow
186. Low, white flower; compound leaf
187. Drenched
190. Marjorie's nickname
191. Preposition
192. Hard-shelled fruits
198. Theodore's nickname
203. Exclamation
205. Point on compass
207. Advertisement
208. Vehicles for transportation
209. Conjunction
211. Double "e"
212. Household nuisance (pl.)
214. Yellow composite; leaves form rosette at ground; seed wind-dispersed
217. Symbol for copper
218. To consume
220. Diminish
221. Distant
222. Anger
223. Leave!
225. French for is
227. To spoil
230. Post meridian
236. Et cetera (scrambled)
238. Exclamation of disgust
239. Atmosphere
240. Student of a school attended by both sexes
241. Hour
242. Girl's name
244. Contest in cattle roping
247. Girl's nickname
248. Hawaiian Islands
250. Close friends
251. Clan or group
252. And so forth
253. Clutch
254. Postscript
255. Arise!
256. City in Nevada
257. Form of to see
258. Argument
261. Sound of a cat
263. Form of "to be"
264. Before
266. Form of "to be"
267. South America
268. Wire gauge
269. Teddy Roosevelt
270. Plural ending
271. Missouri
272. Symbol for chlorine

M. Blanche Cochran

SOLUTION FOR APRIL PUZZLE

ACROSS

2. Caps
4. PS
6. Buds
9. Nest
11. Fang
13. In
14. Mobs
17. Coy
18. Pollen
21. Leaf
23. Lei
24. Calyx
25. Ace
27. Pr
28. Ra
29. Stamen
33. Pot
34. Tin
35. Nook
38. Cult
39. Vessel
41. Soon
43. H–K
45. Lu
46. Et
47. Fr
48. Seed
49. Pi
51. Ovary
53. Petal
54. La
55. It
56. Pollination
61. Si
62. Ala
63. Mon
64. One
66. Ld
67. Composite
68. An

DOWN

1. He
2. Ct
3. Polo
4. Panel
5. Sn
7. Umbel
8. So
9. Nectar
10. Style
11. Filament
12. GM
15. DL
16. SA
18. Pistil
19. LC
20. NYC
22. Fertilization
26. Car
27. Po
29. Stun
30. Anther
31. No
32. Ike
33. Pistil
36. Ovule
37. Is
38. Corolla
40. Sepal
42. Of
44. Key
48. SA
50. Sepal
52. Val
53. Pains
55. Is
57. Old
58. Amp
59. Too
60. Not
65. Ne

A SIMPLE CLASSROOM EXPERIMENT

Dear Dr. Breukelman:

Finally a letter of yours caught up with me. Censorship won't permit me to write much of the work that goes on here, but perhaps you would be interested in an incident that occurred last summer.

I was down in the region of the Volturno River Valley, doing some malaria control work. I have my troubles. First, I speak very little—almost no—Italian. Second, the people were very suspicious. I located Anopheline larvae in a number of areas, in such places as cisterns, covered wells, clothes washing pits, etc., and was trying to get rid of them. I needed the help of the people, but this population was not very helpful. They understood the relation of the mosquito to malaria, but thought I was just another crazy American when I tried to connect larvae with malaria. I finally was able to show them by means of a simple classroom experiment—which luckily worked. I simply put some water and larvae in a large bottle and then covered the bottle. I placed the bottle in one of the houses and managed to convey the idea that they were to watch the bottle—but not to open it at all. I returned in a couple of days, and sure enough—the larvae had become mosquitoes. My simple demonstration had the desired effects in malaria control.

. . . at the time of my entrance into the Army I was teaching in the biology department of Eldorado Junior College; perhaps some day I'll be back again.

Very sincerely yours,

MARVIN D. SOLOMON,
170 Evacuation Hospital,
APO 464, c/o P. M., New York

COLLECTING LADY BEETLES

Connected with my appeal in the advertising columns for paid assistance in a research project, a few pointers concerning the collection of lady beetles may be useful. These beetles hibernate as adults. In some species they are in large masses in winter, in other species in smaller groups or singly. They have been found in grass, often on a slope facing south; in post holes; under leaves on grass plots; in the crevices of stone walls; or singly in the cracks of buildings. The hibernating masses have been found more often in the western mountains (perhaps because the masses are larger there or because they remain in hibernation until later in the season), but are also taken at lower elevations elsewhere.

In the active season, they mostly follow the distribution of aphids, since their principal food is plant lice. As exceptions, the Mexican bean beetle and a few others are plant feeders. In spring some species occur on aphis-infested *Spiraea*. In farm country they are usually to be found, in the first half of the summer, on potato plants, where they feed on the eggs of the potato beetle as well as on aphids. They are found on corn from about the time the corn produces tassels until it is nearly mature, for corn is subject to aphid infestation in that period. From these crop plants the beetles may be removed with thumb and finger, unless they are to be kept alive for breeding purposes, in which case they should be shaken off the plant into a vial with some ventilation. Sweeping roadside vegetation with a strong insect net often takes lady beetles—along with many other kinds of insects. On cool days, lady beetles have been found in numbers settled on beach drift on the shores of the Great Lakes, ten to thirty feet inshore from the high-water mark.

Beetles which are not to be bred will be cleaner if killed before they are shipped. Cyanide, ether or chloroform may be used. Those which are to be shipped alive should be in relatively small groups, and should have plenty of surfaces to rest upon without resting on one another. The extra surfaces can be furnished by crumpled window-screen wire or crumpled newspaper. Hibernating beetles are much easier to ship alive in winter than are active ones in summer. If refrigerator express is available, chance of survival is greatly enhanced by sending that way. Possibly it would help in sending small numbers alive in summer if some aphids on leaves or shoots of the aphids' host plant are enclosed with the beetles.

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(Continued from page 179)

State Teachers Association. *Developing the Thought Process Through Biology Instruction* was the title selected by Max R. Goodson, Assistant principal of University School, Bloomington, Ind. Another pertinent problem, *Biology Curriculum*, was presented by Dr. A. T. Guard, Purdue University. These topics naturally dovetailed together and furnished material for very able discussion. Mr. Wm. Barnes, Ind. State Dept. of Conservation, concluded the program with a worthwhile discussion of some of the work of his department. Closer cooperation between biology teachers and conservationists is desirable. Howard H. Michaud, Ft. Wayne, presided at the meeting.

PREVO L. WHITAKER

ENCYCLOPAEDIA BRITANNICA FILMS

"A cross-sectional check by outstanding educators indicated there are many conceptions as to the true definition of a classroom film," H. R. Lissack, general sales manager of *Encyclopaedia Britannica Films Inc.*, told members of the field representatives in a recent post-war planning meeting.

Mr. Lissack, through field representatives, is still collecting educators' definitions of the classroom film. "One of the definitions," he said, "which received greatest acclaim and which not only defines a classroom film but also defines our product is: 'Encyclopaedia Britannica classroom films are professionally produced to be used by teachers as an integral part of the regular school curriculum.' Inherent in the classroom film is the factor of authenticity and that its use will result in desirable learning."

To distinguish the classroom film from three other general types he pointed out that "the advertising film is one that has as its primary purpose the creation of point of view, attitudes, or knowledges about a service or a thing which represents the primary interest of the sponsor of the film.

"Among others there are two other general types of films," he explained, "the documentary and the entertainment. The documentary film is one which realistically and in an undisguised manner interprets the events or the cultures of the day in terms of the developments of the past for the purpose of stimulating constructive thinking and planning the future.

"Contrasting the Encyclopaedia Britannica Classroom film to the entertainment film," Mr. Lissack concluded, "the entertainment film is one which has as its first objective, emotional release and secondly, may contribute to broad cultural backgrounds, but which usually recognizes no age or academic limits."

INDEX TO VOLUME 7

After Exposure—What?, James Perkins Saunders, 42
Agersborg, H. P. K., To Everyone, Greetings!, 112
American Education Week, 22
Appreciation Through Classroom Organization, Charles W. Gouget, 55
Atlas in General Biology, (review). Alfred M. Elliott, 166
Audio-Visual Program, 64

Bailey, Alfred M., Filming in the High Country, 45
Biological Briefs, Ruth Sherman Stein, 95, 164
Biology and the Future of Man, Science of, A. J. Carlson, 75
Biology Laboratory, A Living, Irving C. Keene, 173
Biology Teaching in Cleveland, Direction of, Vincent R. Peterson, 61
Bird Photography with Biology Students, Allen Downs, 31
Blakeslee, Albert F., Teachers Talk Too Much, 136
Blood Factor, A Brief Review of the Genetics and Clinical Importance of, Herluf H. Strandskov, 128

Books Reviewed
A Design for General Education, 92
Armstrong, W. Earl, Hollis Ernest V., and Davis, Helen E., The College and Teacher Education, 165
Bishop, Sherman C., Handbook of Salamanders, 69
Evendon, E. S., Teachers for Our Times, 166
Grant, Julius, Hackh's Chemical Dictionary, 143
Gustafson, A. F., Guise, C. H., Hamilton, W. J., Jr., Ries, H., Conservation in the United States, 69
Hoagland, Dennis R., Lectures on the Inorganic Nutrition of Plants, 92
Hoerr, Normand L., et al., Frontiers in Cytochemistry, 69
Jean, Frank C., Harrah, E. C., and Powers, S. R., Man and His Biological World, 69
Morris, Percy A., They Hop and Crawl, 92
Pope, Clifford, Amphibians and Reptiles of the Chicago Area, 166
Rafinesque, C. S., A Life of Travels, 120
Rodgers, Andrew Denny American Botany, 144
Smith, Ella T., Exploring Biology, 93
Weckstein, A. M., Directed Activities in Biology, 120

By the Way, 15, 21, 57, 126, 162, 185

Canadian Nature, 15, 35
Carlson, A. J., The Science of Biology and the Future of Man, 75
Cataloguing and Filing Kodachromes, Method of, Richard L. Weaver, 114
Chemical Gardening in the High School Laboratory, Karlem Riess, 101
Chicago Biology Round Table, 95
Classroom Experiment, A Simple, Marvin D. Solomon, 189
Clay Models for the School Museum, Gertrude S. Evans, 51
Clay Tiles, Incised Patterns in, Gertrude S. Evans, 163
Cleveland Meeting, 39
Cochran, M. Blanche, Vocabulary Study via Cross-word Puzzle, 151
Colin, E. C., Materials Used in Teaching Genetics, 134
Collecting Lady Beetles, A. Franklin Shull, 189
Conservation Series, Unit V, Wildflower Conservation, P. L. Ricker, 153
Cross-word Puzzle, 152, 186
Culinary Herbs, A. E. Hutchins, 16

DDT, Concerning, 141
Dobzhansky, Theodosius, What Is Heredity?, 127
Downs, Allen, Bird Photography with Biology Students, 31

Downs, Theodore, Photography Through the Microscope, 35

Editorial Comment, 14, 38, 60, 86, 115, 132, 161
Education for All American Youth, Oscar Riddle, 116
Education in Armed Services, Guide to Evaluation, 167
Eight-Year-Old Looks at His World, Louise A. Neal, 5
Election Notice, 167
Elliott, Alfred M., Atlas in General Biology (review), 166
Evans, Gertrude S., A Simple Motor-Pattern Test, 18, Clay Models for the School Museum, 51, Incised Patterns in Clay Tiles, 163
Eyestone, B. L. and Trump, Richard F., A Photography Project for Biology, 38

Fairy Shrimps, Donald S. Lacroix, 164
Feeding Plants, Helen Field Watson, 10
Field Trips with a Long-Range Purpose, Mary D. Rogick, 79
Filming in the High Country, Alfred M. Bailey, 45
Films, Review of, 70
Filmstrips for Schools, 166
Flower Parts Cross-word Puzzle, 152
From the Managing Editor, Charles B. Price, 110

Gadgets, Donald S. Lacroix, 20
Genetics issue, (editorial), 132
Genetics, Special Issue, March, 123
Gerberich, John B., Rearing Tree-Hole Organisms in the Laboratory, 83
Gouget, Charles W., Appreciation Through Classroom Organization, 55

Harvard Apparatus Company and Dr. W. T. Porter, 71
Hatching Individual Frog Eggs, James Perkins Saunders, 140
Heller, David H., A Letter from Somewhere in Belgium, 85
Helping Crippled Children, 94
Heredity, What is, Theodosius Dobzhansky, 127
Hollenbeck, Irene, Preview of Biology, 182
Hutchins, A. E., Culinary Herbs, 16

Jeffers, G. W., International Biology, 64

Keene, Irving C., A Living Biology Laboratory, 173

Lacroix, Donald S., Gadgets, 20, Photography, 27, A Biology Reference Shelf, 58, Migration of Birds, 113, Fairy Shrimps, 164
Letter from Somewhere in Belgium, David H. Heller, 85
Living Memorial, Plan for, Richard Rogers, 111
Lockwood, Betty, Our Responsibilities, (editorial), 161
Loehwing, W. F., Current Developments in Science and Biology Teaching, 89

Materials Used in Teaching Genetics, E. C. Colin, 134
Meetings, 14, 39, 85, 94, 95, 112, 162, 179
Membership Statistics, 181
Migration Routes of Birds, Donald S. Lacroix, 113
Miller, Jesse V., Teaching Heredity the Scientific Way, 123
Moment, G. B., A Method for Quieting Paramecium, 59
Motor-Pattern Test, A Simple, Gertrude S. Evans, 18
Mounting Guard Cells, A Method of, Ralph A. Rood, 64

Neal, Louis A., An Eight-Year-Old Looks at His World, 5
New Managing Editor, 152
New York Association of Biology Teachers, 94, 162
Notes on Locals, Prevo Whitaker, 162, 179

Our Responsibilities, (editorial), Betty Lockwood, 161

Peterson, Vincent R., The Direction of Biology Teaching in Cleveland, 61
Pharmacy, Future of, 71
Photo Club, Why Not A, Ralph A. Rood, 40
Photos, Tell It With, W. J. Sumpstine, 88
Photography, Donald S. Lacroix, 27
Photography Project for Biology, A, B. L. Eyestone and Richard F. Trump, 38
Photography, Special Issue, November, 27
Photography Through the Microscope, Theodore Downs, 35
Pittsburgh Regional Meeting, 14
Plant Collecting in a Beginning Botany Course, Egbert H. Walker, 176
Population Genetics of Lady Beetles, A. Franklin Shull, 142
Post-War Education, Science in, Guy F. Williams, 147
President's Page, 13, 180
Previews of Biology, Irene Hollenbeck, 182
Price, Charles B., 133
Price, Charles B., From the Managing Editor, 110

Quieting Paramecium, Method for, G. B. Moment, 59

Recent Publications, 70, 93
Reference Shelf, A Biology Donald S. Lacroix, 58
Ricker, P. L., Wild Flower Conservation, (Conservation, Unit V), 153
Riddle, Oscar, Education for All American Youth, 116
Riess, Karlem, Chemical Gardening in the High School Laboratory, 101
Rogers, Richard, Plan for Living Memorial, 111
Rogick, Mary D., Field Trips with a Long-Range Purpose, 79
Rood, Ralph A., Why Not a Photo Club?, 40, A Method of Mounting Guard Cells, 64
Rutgers University Research Council, 21

Saunders, James Perkins, After Exposure—What?, 42, Hatching Individual Frog Eggs in Test Tubes, 140
Science and Biology Teaching, Current Developments in, W. F. Loehwing, 89
Shinn, Edwin H., How Teachers May Promote Summer Garden Projects, 184
Shull, A. Franklin, Population Genetics of Lady Beetles, 142, Collecting Lady Beetles, 189
Silent Teaching, Helen Field Watson, 149

Solomon, Marvin D., A Simple Classroom Experiment, 189
Southern California Association of Life Science Teachers, 112
Southwestern Pennsylvania Biology Teachers Club, 85
Special Issues, 21
Spring Flower Cross Word Puzzle, 186
Stein, Ruth Sherman, Biological Briefs, 95, 164
Strandskov, Herluf H., A Brief Review of the Genetics and Clinical Importance of the Rh Blood Factor, 128
Summer Garden Projects, How Teachers May Promote, Erwin H. Shinn, 184
Sumpstine, W. J., Tell It with Photos, 88

Take A Picture of It, Richard Trump, (editorial) 38
Teachers Talk Too Much, Albert F. Blakeslee, 136
Teaching Heredity the Scientific Way, Jesse V. Miller, 123
To Everyone—Greetings!, H. P. K. Agersborg, 112
Treasurer's Report, 15
Tree-Hole Organisms, Rearing in the Laboratory, John B. Gerberich, 83
Trowbridge, Helen, President's Page, 13
Trump, Richard F., Take a Picture of It (editorial), 38, see Eyestone, B. L.

Visual Education Project, Roy James Watson, 87
Vocabulary Study via Cross-Word Puzzle, M. Blanche Cochran, 151

Walker, Egbert H., Teaching Plant Collecting in a Beginning Botany Course, 176
Walker Prizes in Natural History, 63
Watson, Helen Field, Feeding Plants, 10, Silent Teaching, 149
Watson, Roy James, A Visual Education Project, 87
Weaver, Richard L., A Method of Cataloguing and Filing Kodachromes, 114
Whitaker, Prevo L., Editorial Comment, 60, Notes on Locals, 162
Wildflower Conservation, P. L. Ricker, 153
Williams, Guy F., Science in Post-War Education, 147

LADY BEETLES WANTED

The undersigned is prepared to buy collections of lady beetles from anywhere in North America. Dry specimens will usually suffice; only occasionally will live beetles be needed. Offers are invited.

A. FRANKLIN SHULL, *Dept. of Zoology*
University of Michigan Ann Arbor, Mich.

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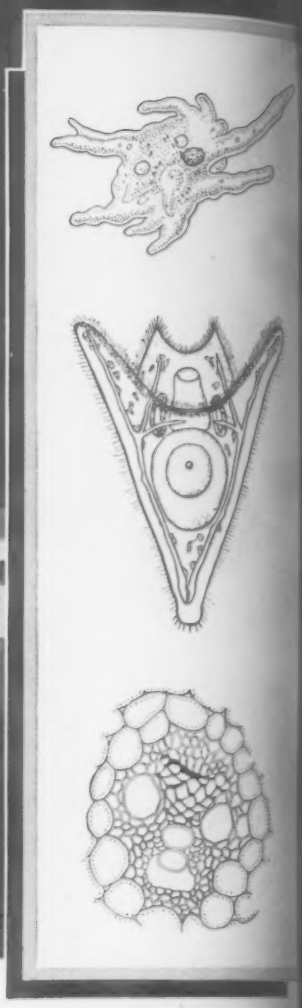

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